BRAILLE CELL ASSEMBLY HAVING HOLDER TRAY

BACKGROUND OF THE INVENTION

This invention relates to braille cell assemblies of the type used by visually impaired individuals to convert representations of information from electrical signals to mechanical movement and vice versa; and more particularly, to an apparatus and a method for maintaining individual braille cells in proper positions in a cell assembly.

Much information now is at some time represented by electrical signals. For example, input/output data and interactive information provided by a computer often is in the form of electrical signals if it does not have to be easily understood by a human. If the information is output information to be read, these electrical signals normally control operation of a display monitor or printer. The information in display or printed form, though, is not readable by a blind person or by many of the visually impaired. For this reason, arrangements have been developed to convert between electrical signal forms of information and braille.

Devices of the above type designed for use with computers are referred to as braille computer display systems. Such systems provide computer processing abilities to the blind and visually handicapped. These systems include an assembly of braille cells. Each individual cell typically includes a plurality of bimorph reeds whose mechanical movements are electrically controlled to convert information between electrical signal representations and desired mechanical movement. The arrangement of individual braille cells of this nature into an assembly provides a system which enables the detection or input of multiple signals by those capable of using braille. Braille cells and their assembly are quite old. U.S. Pat. Nos. 4,473,356 and 4,758,165 describe typical cells.

It is important that the locations of individual braille cells be quite precise. Those that have been available in the past, though, are not as good as is desired in this connection. Many of the problems are caused by the fact that it simply is impossible that cells be made and assembled with exact precision, i.e., dimensional tolerances must be used. In this connection, in most assemblies the individual braille cells rely on contact with adjacent braille cells for positioning. That is, most assemblies are made by threading a plurality of braille cells together on one or more rods. These rods are passed through holes in the frames of the cells. It will be seen that with this construction, adjacent cells rely on contact with one another for positioning in the assembly. In other words, the individual deviations in the braille cells will be added in the assembly, with the result that the assembly itself may depart significantly from desired dimensions.

In view of the above, it is common for each assembly to be manually adjusted by squeezing the cells together. In some instances it is even necessary that an assembler sand or file the sides of selected braille cells in order to make the total assembly be of a certain size. (In some instances it is necessary for the assembler to add shims on the rods to make sure the assembly meets the desired dimension.)

It will be appreciated that the problem is compounded in longer displays—the number of accumulated deviations is, of course, proportional to the number of cells in a display. Long displays also have the problem of buckling, i.e., the longer the rods are the more prone they are to the slight bending that is responsible for buckling.

It will be seen that the problem is exacerbated by handling of the assembly after it is first produced, e.g., handling for

packaging and transportation. That is, even after an assembly is adjusted as necessary at the point of manufacture, the length of the assembly may be slightly changed and such assembly must again be adjusted. This is particularly a problem in the normal situation in which it is one manufacturer who makes the braille assembly and it is another that installs it in a reader.

The cells in many prior assemblies also change position over time—these assemblies simply do not have the rigidity necessary to maintain a set position.

SUMMARY OF THE INVENTION

The present invention provides a braille cell assembly which has and maintains precision cell positioning. Such braille cell assembly includes a holder selected to be capable of itself rigidly maintaining the individual cells in predetermined positions adjacent one another.

It has been found that with use of such a holder, the precision in positioning is achieved without reliance at all on the cells themselves. As will be discussed in more detail hereinafter, although the holder of the invention is particularly useful because it circumvents the accumulation of deviations in one direction because of adjacent cells defining positions in an assembly, the holder provides support in three different orthogonal directions. The result is that the desired precision in positioning is achieved simply on the basis of the precision provided by the holder alone and its interface with the remainder of the structure. This precision is, in essence, provided to all of the braille cells making up the assembly. Moreover, the individual cells are removable for repair or replacement without disturbing the precise positioning of other cells.

Most desirably, the holder is a tray, and it provides the rigidity by engaging each of the cells at two or more spaced positions. The interlocking structure which does this includes a flange on such tray and a complementary slot on each of the individual cells. In this connection, each of the cells includes a support frame which defines the slot and has a notch projection therewithin which engages a complementary reception notch in the flange.

The invention includes not only the physical structure itself, but a method of forming a braille cell assembly which assures that the braille cells are maintained in position.

Other features and advantages of the invention either will become apparent or will be described in connection with the following, more detailed description of a preferred embodiment of the invention and variations.

BRIEF DESCRIPTION OF THE DRAWING

With reference to the accompanying drawing:

FIG. **1** is an isometric view of a braille computer display system incorporating a preferred embodiment of the invention;

FIG. **2** is an overall isometric and exploded view of such preferred embodiment;

FIG. **3** is a broken away, top elevation view of a prior art braille assembly, which view is being included to emphasize the importance of the instant invention;

FIG. **4** is a broken away, top elevation view of the preferred embodiment of the invention, which view is similar to that of FIG. **3**;

FIG. **5** is a front elevation view of the preferred embodiment of the invention shown in the earlier figures;

FIG. **6** is an enlarged sectional view of the preferred embodiment of the invention illustrated in the other figures; and